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ABSTRACT

The purpose of this paper is to review some of the methods used for the impact evaluation of Demonstrator-Developer projects and to promote the meta-analysis approach. Four examples of attempts to collect and analyze impact data from adopters are presented, one of which used the meta-analysis approach. In this example, each adopter collected pre and post data using instrumentation specified by the parent project. The results were used to compute an effect size (a standardized growth measure) for each project using the performance of the control group in the original project. Using this approach, one not only is able to get an estimate of the effectiveness of each separate adoption, but the data can easily be aggregated for an estimate of the effectiveness of the parent project. (BW)

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A META-ANALYSIS APPROACH TO IMPACT EVALUATION OF ADOPTIONS

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Introduction

Demonstrator-Developer (DD) projects of the National Diffusion Network (NDN) have always been asked to supply evaluative data. The type of evaluative data usually falls into the following three catagories--management, implementation, and impact. Evaluative data on management are quite straight forward and well documented. For the most part they include descriptions and counts of dissemination activities. Implementation data are estimates of whether adopters have implemented the key elements of the parent project. Impact evaluation data on the effectiveness of adoptions have been more elusive.

The purpose of this presentation is to review some of the methods used for the impact evaluation of DD projects and to promote the meta-analysis approach. DD projects often have little or no control over the evaluation design (if any) that is used to evaluate the effectiveness of an adoption. Different adopters may use many varied evaluation designs. Further, most of these designs will not include a control group. For this reason, aggregating these data to obtain an overall picture of the effectiveness of adoptions is often impossible.

Examples of Impact Evaluation of Adoptions

The NDN heretofore has not enforced a requirement that DD projects gather the rigid type of impact data that JDRP would require. In most cases, impact data were not collected at all or their collection was left up to the adopters. This section presents four examples of attempts to collect and analyze impact data from adopters.

In the first approach, data were not requested until after the project was implemented. Available data were collected and analyzed separately for each adoption. The results were reported for each adoption. This approach was used to summarize the effectiveness of adoptions of the Talents Unlimited Program in 1979 (Chissom & McLean, 1980).

The approach was effective in uncovering seven situations where impact data for the Talents Unlimited Program were available. The difficulty in this approach was that the evaluators had no control over the quality of the data collected. In fact, in most cases, the information on how the data were collected, how the students were selected, etc. was not available.

In order to remedy these problems, a paper was written which specified the design requirements for establishing the validity of Talents Unlimited adoptions (McLean & Chissom, 1980a). The results of this approach were used for some of the Talents Unlimited adoptions during the 1979-80 school year (McLean & Chissom, 1980b). During that year, 17 adopting school systems agreed to participate in the impact study using the guidelines as noted above (McLean & Chissom, 1980a). Complete data were obtained from 10 of these adopters. Later, data from one of the 10 were excluded because it was determined the data lacked validity due to the testing conditions.

This approach, although better than the first, still had a number of problems. The greatest of these was the requirement that every participating adopter use exactly the same design. In the end, about one-half of the original participants were excluded because this was impossible.

A third approach involved a post hoc application of meta- analysis to adopter impact evaluation. This approach was used by Harpole (1982) to determine if the degree to which the key elements of the Pegasus-Pace reading program were implemented was related to the effect size (a standardized growth measure) of the participants. Each adopter provided pre- and post-test data

which were used to determine effect size. Each adopter also completed a questionnaire which was used to determine the extent to which the key elements of the program were implemented. The main disadvantage of this approach was the post hoc nature of its application. It was not necessary to exercise control over the implementation of the evaluation at each site.

The forth, and probably the best, example to be presented here is the one used by the State of Georgia's Educational Improvement Office and directed by Gearld Klein. The procedure was used to evaluate eight projects which have been state validated (five of which have also been validated by JDRP) and are receiving funds for state dissemination (Yeany & Okey, 1982). The design requires each adopter to agree to collect pre and post data using instrumentation specified by the parent project. The results are used to compute an effect size for each project using the performance of the control group in the original project.

During the 1981-82 year, the eight projects had 45 adoptions which involved over 135,000 students. The average effect size (the experimental groups' gain in standard deviation units exceeding that of the original control group) was .73 and ranged from .30 to 1.60 (Yeany & Okey, 1982). "An effect size of this magnitude corresponds to a shift of 26 percentile units from pre to post," (Yeany & Okey, 1982, p. 50). There are several obvious advantages to this approach. One not only is able to get an estimate of the effectiveness of each separate adoption, but the data can easily be aggregated for an estimate of the effectivenss of the parent project.

The Meta-analysis Approach

As can be seen from the preceding examples, a meta-analysis approach holds great promise for the impact evaluation of DD projects. This sections

provides a more in-depth look at this approach and suggests specific methods for implementing it.

What Is Meta-analysis?

Meta-analysis is a quantitative approach to analyzing the literature on a topic (Glass, McGaw, & Smith, 1981). It forces the researcher to systematically derive quantitative information from each research study being reviewed. Thus, a large number of studies on a particular topic can be quantified, analyzed, and findings summarized.

Meta-analysis provides a vehicle for overcoming the problems of reviewing literature and as was seen in the previous section, it can also provide a means of evaluating the impact of a large number of adoptions. Meta-analysis provides the promise of assimilating a large number of studies into general conclusions. While there are many methodological hurdles which must be overcome in its application, meta-analysis certainly has a number of advantages over previously utilized approaches.

Whereas meta-analysis is a quantitative method, of analysis, its purpose is to provide general knowledge based on the individual results of several studies. For example, if project A was found to be successful in one study and not successful in another, meta-analysis has the potential to identify the reason for the different findings. This is done by considering possible concomitant variables in the meta-analysis.

The quantification of a large number of studies presents a number of methodological problems. Among these are the identifi- cation of possible related variables, coding of concomitant vari- ables, measuring effect size, and analyzing the results. All of these are problems of traditional research and evaluation except measuring effect size. The effect size is a standardized difference score between the treatment and control groups.

Effect size is one of the concepts central to the application of meta-analysis methodology.

One of the most perplexing problems in meta-analysis is the problem of the conclusion depending on the method of aggregation or analysis used. When the results depend on the method, one of the methods has led to an erroneous result. Glass et al. (1981) report a study by Simpson on amphetamine therapy with hyperactive sixth-grade children which revealed opposite results depending on what method of data aggregation was used. Other examples are also available in the literature.

Recovering Effect Size

A problem unique to meta-analysis is that of determining effect size. It is interesting to note that effect size can be often be determined with many different design types. Obviously, fewer questions concerning the internal validity of the designs will arise when the design is specified as with the Yeany and Okey example (1982).

Effect size has been defined in different ways. In general, it can be defined as the posttest minus the pretest divided by the pretest standard deviation (Glass, et al., 1981 & Yeany & Okey, 1982). This definition does not take into account the performance of the control group. Thus, it can be modified to be the experimental mean minus the control mean divided by the control standard deviation (Glass, et al., 1981 & Yeany & Okey, 1982). The important point is that it is defined the same way throughout a single study and the definition is made clear for interpretation purposes.

As was noted earlier, effect sizes can be recovered for numerous situation, even where very different designs and analyses were used. Deaton (1982) indicated methods for recovering effect sizes for situations where differences were compared using t-tests, F-tests (ANOVA), and nonparametric

procedures. He also provided techniques for recovering effect sizes for various correlational methods.

Analysis of Effect Sizes

Once effect sizes have been recovered, they can be used as the dependent measures in many types of analyses. The advantage of this is that such use can help provide information on when a program is effective and when it is not. For example, suppose that a reading program is effective for first graders but becomes less effective in the upper elementary grades. Using effect size as the dependent variable and grade as the dependent variable in an analysis of variance will establish this.

By converting the data from each site to effect sizes, the data can be aggregated and almost any analysis performed. The problem of arriving at an overall conclusion about the effective of the program is simplified greatly. The effectiveness of individual sites can be compared and ranked (e.g., Yeany & Okey, 1982).

Summary

Evaluating the impact of project adopters has long been a thorn in the side of DD projects. Meta-analysis does not eliminate all of these problems but should certainly reduce them. As experience is gained with this approach to evaluating the impact of adoptions, the data can be aggregated not only over sites but over years. Analyses can be done to determine the most effective implementation methods and conditions and, at the same time, reduce the requirements for specific types of score scales. It could also be used to monitor adopters.

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